

Form PTO 1449 (Rev. 2-32)		U.S. Department of Commerce Patent and Trademark Office		Atty. Docket No. IMMR-0091B (034701-562)		Serial No. 10/671,465	
 Information Disclosure Statement by Applicant (Use several sheets if necessary)				Applicant: Alex S. Goldenberg et al.			
				Filed: 09/29/2003		Group: 2629	
U.S. Patent Documents							
	Document No.	Date	Name	Class	Subclass	Filing Date	
	3,623,046	11/23/1971	Scourtes				
	4,811,921	03/14/1989	Whitaker et al.				
	5,172,092	12/15/1992	Nguyen et al.				
	5,389,849	02/14/1995	Asano et al.				
	5,435,729	07/25/1995	Hildreth et al.				
	5,437,608	08/01/1995	Cutler				
	5,731,804	03/24/1998	Rosenberg				
	5,691,898	11/25/1997	Rosenberg et al.				
	5,629,594	05/13/1997	Jacobus et al.				
	5,952,806	09/14/1999	Muramatsu				
	6,216,059	04/10/2001	Ierymenko				
	6,246,390	06/12/2001	Rosenberg				
	6,256,011	07/03/2001	Culver				
	6,424,356	07/23/2002	Chang et al.				
	6,448,977	09/10/2002	Braun et al.				
	6,636,197	10/21/2003	Goldenberg et al.				
	7,061,467	06/13/2006	Rosenberg				
	4,262,240	04/14/1981	Arai				
	4,382,217	05/03/1983	Horner et al.				
	4,422,060	12/20/1983	Matsumoto et al.				
	5,184,310	02/02/1993	Takenouchi				
	5,194,786	03/16/1993	Smith et al.				
	5,334,893	08/02/1994	Oudet et al.				
	5,456,341	10/10/1995	Garnjost et al.				
	5,492,312	02/20/1996	Carlson				
	5,554,900	09/10/1996	Pop, Sr.				
	5,649,020	07/15/1997	McClurg et al.				
	5,650,704	07/22/1997	Pratt et al.				
	5,734,236	03/31/1998	Motegi				
	6,057,753	05/02/2000	Myers				
	6,686,901	02/03/2004	Rosenberg				
	4,334,280	06/08/1982	McDonald				
	4,355,348	10/19/1982	Williams				
	5,907,212	05/25/1999	Okada				
Examiner				Date Considered			
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Information Disclosure Statement by Applicant						Applicant: Alex S. Goldenberg et al.			
(Use several sheets if necessary)						Filed: 09/29/2003		Group: 2629	
Foreign Documents									
								Translation	
Init.		Document No.	Date	Country	Class	Subclass	Yes	No	
Other Documents (Including Author, Title, Date, Pertinent Pages, etc.)									
		Jackson, K. M., "Linearity of Radio-Frequency Transducers," Med. & Biol. Eng. and Computer, July 1977, 15, pp. 446-449.							
		Russo, Massimo Andrea, "The Design and Implementation of a Three Degree of Freedom Force Output Joystick," Dept. of Mechanical Engineering, MIT May 1990, 131 pages.							
Examiner						Date Considered			
Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include a copy of this form with the next communication to applicant.									

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Substitute for form 1449A/PTO		Complete if Known		
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)		Application Number	Unknown	
		Filing Date	September 29, 2003	
		First Named Inventor	Alex S. GOLDENBERG	
		Class Art Unit	2673	
		Examiner Name	Unassigned	
2	of	4	Attorney Docket Number	IMMR-073/02US

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No. ¹	Foreign Patent Document			Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY
		Office ²	Number ³	Kind Code ⁴ (if known)		
A	BI		0 349 086	A1	Sterk Kwast B.V.	01/03/1990

¹ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3).
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INFORMATION DISCLOSURE
STATEMENT BY APPLICANT

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3 of 4

Application Number	Unknown
Filing Date	September 29, 2003
First Named Inventor	Alex S. GOLDBERG
Group Art Unit	2673
Examiner Name	Unassigned
Attorney Docket Number	IMMR-473/02US

OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
	(C1)	Balgrie, "Electric Control Loading - A Low Cost, High Performance Alternative," <i>Proceedings of Interservice/Industry Training Systems Conference</i> , pp. 247-254, November 6-8, 1990	
	(C2)	Iwata, "Pen-based Haptic Virtual Environment," 0-7803-1363-1/93 IEEE, pp. 287-292, 1993	
	(C3)	Russo, "The Design and Implementation of a Three Degree of Freedom Force Output Joystick," <i>MIT Libraries Archives</i> pp. 1-131, May 1990, archived 8/14/90	
	(C4)	Brooks et al., "Hand Controllers for Teleoperation - A State-of-the-Art Technology Survey and Evaluation," <i>JPL Publication 85-11</i> , NASA-CR-175890; N85-28559, pp. 1-84, 03/11/1985	
	(C5)	Jones et al., "A perceptual analysis of stiffness," ISSN 0014-4819 Springer International (Springer-Verlag); <i>Experimental Brain Research</i> , Vol. 79, No. 1, pp. 150-156, 1990	
	(C6)	Burdea et al., "Distributed Virtual Force Feedback, Lecture Notes for Workshop on Force Display in Virtual Environments and its Application to Robotic Teleoperation," 1993 IEEE International Conference on Robotics and Automation, pp. 25-44, 05/02/1993	
	(C7)	Snow et al., "Model-X Force-Reflecting-Hand-Controller," NT Control No. NPO-17851; JPL Case No. 7348, pp. 1-4 with 45 pages of attachments, 06/15/1989	
	(C8)	Ouh-Young, "Force Display in Molecular Docking," Doctoral Dissertation, University of North Carolina at Chapel Hill, UMI Order No. 9034744, p. 1-369, 1990	
	(C9)	Tadros, "Control System Design for a Three Degree of Freedom Virtual Environment Simulator Using Motor/Brake Pair Actuators," <i>MIT Archive</i> , pp. 1-88, February 1990, archived 8/13/90	
	(C10)	Caldwell et al., "Enhanced Tactile Feedback (Tele-Taction) Using a Multi-Functional Sensory System," 1050-4729/93, pp. 955-960, 1993	
	(C11)	Adelstein et al., "Design and Implementation of a Force Reflecting Manipulandum for Manual Control research," DSC-Vol. 42, <i>Advances in Robotics</i> , pp. 1-12, 1992	
	(C12)	Gotow et al., "Controlled Impedance Test Apparatus for Studying Human Interpretation of Kinesthetic Feedback," WAI1-11:00, pp. 332-337	
	(C13)	Stanley et al., "Computer Simulation of Interacting Dynamic Mechanical Systems Using Distributed Memory Parallel Processors," DSC-Vol. 42, <i>Advances in Robotics</i> , pp. 55-61, ASME 1992	
	(C14)	Russo, "Controlling Dissipative Magnetic Particle Brakes in Force Reflective Devices," DSC-Vol. 42, <i>Advances in Robotics</i> , pp. 63-70, ASME 1992	
	(C15)	Kontarinos et al., "Display of High-Frequency Tactile Information to Teleoperators," <i>Telemanipulator Technology and Space Telerobotics</i> , Won S. Kim, Editor, Proc. SPIE Vol. 2057, pp. 40-50, Sep. 7-9, 1993	
	(C16)	Patrick et al., "Design and Testing of A Non-reactive, Fingertip, Tactile Display for Interaction with Remote Environments," <i>Cooperative Intelligent Robotics in Space</i> , Rui J. deFigueiredo et al, Editor, Proc. SPIE Vol. 1387, pp. 215-222, 1990	
	(C17)	Adelstein, "A Virtual Environment System For The Study of Human Arm Tremor," <i>Ph.D. Dissertation</i> , Dept. of Mechanical Engineering, MIT, June 1989, archived 3/13/90	
	(C18)	Bejczy, "Sensors, Controls, and Man-Machine Interface for Advanced Teleoperation," <i>Science</i> , Vol. 208, No. 4450, pp. 1327-1335, 1980	
	(C19)	Bejczy et al., "Generalization of Bilateral Force-Reflecting Control of Manipulators," <i>Proceedings Of Fourth CISM-IFTOMM</i> , Sep. 8-12, 1981	
	(C20)	McAfee et al., "Teleoperator Subsystem/Telerobot Demonstrator: Force Reflecting Hand Controller Equipment Manual," JPL 1988, JPL D-5172	
	(C21)	Minsky, "Computational Haptics: The Sandpaper System for Synthesizing Texture for a Force-Feedback Display," <i>Ph.D. Dissertation</i> , MIT, June 1995, archived 7/6/95	
	(C22)	Jacobsen et al., "High Performance, Dextrous Telerobotic Manipulator With Force Reflection," <i>Intervention/ROV '91 Conference & Exposition</i> , Hollywood, Florida, May 21-23, 1991	
	(C23)	Shimoga, "Finger Force and Touch Feedback Issues in Dexterous Telemanipulation," <i>Proceedings of Fourth Annual Conference on Intelligent Robotic Systems for Space Exploration</i> , Rensselaer Polytechnic Institute, Sep. 30- Oct. 1, 1992	
	(C24)	IBM Technical Disclosure Bulletin, "Mouse Ball-Actuating Device With Force and Tactile Feedback," Vol. 32, No. 9B, February 1990	
	(C25)	Terry et al., "Tactile Feedback In A Computer Mouse," <i>Proceedings of Fourteenth Annual Northeast Bioengineering Conference</i> , University of New Hampshire, March 10-11, 1988	
	(C26)	Howe, "A Force-Reflecting Teleoperated Hand System for the Study of Tactile Sensing in Precision Manipulation," <i>Proceedings of the 1992 IEEE International Conference on Robotics and Automation</i> , Nice, France, May 1992	
	(C27)	Eberhardt et al., "OMAR - A Haptic display for speech perception by deaf and deaf-blind individuals," <i>IEEE Virtual Reality Annual International Symposium</i> , Seattle, WA, Sep. 18-22, 1993	

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Substitute for form 1449A/PTO		Complete if Known		
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)		Application Number	Unknown	
		Filing Date	September 29, 2003	
		First Named Inventor	Alex S. GOLDENBERG	
		Group Art Unit	2673	
		Examiner Name	Unassigned	
4	of	4	Attorney Docket Number	IMMR-073/02US

—	C25	Rabinowitz et al., "Multidimensional tactile displays: Identification of vibratory intensity, frequency, and contractor area," <i>Journal of The Acoustical Society of America</i> , Vol. 82, No. 4, October 1987	
↓	C29	Bejczy et al., "Kinesthetic Coupling Between Operator and Remote Manipulator," <i>International Computer Technology Conference, The American Society of Mechanical Engineers</i> , San Francisco, CA, August 12-15, 1980	
	C30	Bejczy et al., "A Laboratory Breadboard System For Dual-Arm Teleoperation," <i>SOAR '89 Workshop, JSC, Houston, TX</i> , July 25-27, 1989	
	C31	Oukyoung et al., "A Low-Cost Force Feedback Joystick and Its Use in PC Video Games," <i>IEEE Transactions on Consumer Electronics</i> , Vol. 41, No. 3, August 1995	
	C32	Marcus, "Touch Feedback in Surgery," <i>Proceedings of Virtual Reality and Medicine The Cutting Edge</i> , Sep. 8-11, 1994	
↓	C33	Bejczy, et al., "Universal Computer Control System (UCCS) For Space Telerobots," CH2413-3/87/0000/0318501.00 1987 IEEE 1987	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Unique citation designation number.
²² Applicant is to place a check mark here if English language Translation attached.

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PTO/SB/08A (10-01)

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet **3** of **6**

Complete If Known

Application Number	10/671,465
Filing Date	September 28, 2003
First Named Inventor	Alex S. Goldenberg
Art Unit	2673
Examiner Name	Unassigned
Attorney Docket Number	IMMR-073/02US

U.S. PATENT DOCUMENTS

Examiner	Cite No. ¹	Document Number Number Kind Code ² (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
S.M.		4,795,298	1/3/88	Jau	
		4,731,603	3/15/88	McRae et al.	
		4,706,294	11/10/87	Ouchida	
		4,484,191	11/20/1984	Vavra	
		4,484,112	8/7/1984	Foerst	
		4,414,984	11/15/83	Zarudiansky	
		4,333,070	6/1/1982	Barnes	
		4,262,549	4/21/1981	Schwelienbach	
		4,127,752	11/28/1978	Lowthorp	
		3,919,691	11/11/75	Noll	
		2,972,140	2/14/1961	Hirsch	
		RE37,374	9/18/01	Roston et al.	

Examiner Initials*	Cite No. ¹	Foreign Patent Document			Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Country Code ³	Number ⁴	Kind Code ⁵ (if known)			
		JP	H2-185278		7/19/1990	Taito Corporation	
		JP	H4-8381		1/13/1992	Epoch Co. and Key- Planning Co.	
		JP	H7-24147		1/27/1995	Sega Corporation	
		JP	H5-192449		8/3/1993	Taito Corporation	
		WO	92/00559		1/8/1992		
		EP	0607580	A1	7/27/1994		
		EP	0265011		4/27/1998		
	02	EP	0626834	A2	5/11/1994		
		WO	01/03105		1/11/2001		
		WO	01/24158		4/5/2001		
		WO	97/31333		8/28/1997		
		WO	01/13354		2/22/2001		
		WO	98/32112		7/23/1998		
		WO	99/40504		12/8/1999		
		WO	02/27705		4/4/2002		

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Sheet 4 of 6

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Application Number	10/671,465
Filing Date	September 29, 2003
First Named Inventor	Alex S. Goldenberg
Art Unit	2673
Examiner Name	Unassigned
Attorney Docket Number	IMMR-073/02US

OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No. 1	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
—	0	PATRICK, "Design, Construction, and Testing of a Fingertip Tactile Display for Interaction with Virtual and Remote Environments," <i>Master of Science Thesis</i> , MIT, Aug. 1990, archived Nov. 8, 1990.
✓	✓	CALDER, "Design of A Force-Feedback Touch-Introducing Actuator For Teleoperator Robot Control," <i>Bachelor of Science Thesis</i> , MIT, May 1983, archived June 23, 1983.
✓	✓	WIKER, "Teletouch Display Development: Phase 1 Report," <i>Technical Report 1230</i> , Naval Ocean Systems Center, San Diego, July 1988.
✓	✓	BLISS, "Optical-to-Tactile Image Conversion for the Blind," <i>IEEE Transactions on Man-Machine Systems</i> , Vol. MMS-11, No. 1, March 1970.
✓	✓	JOHNSON, "Shape-Memory Alloy Tactile Feedback Actuator," <i>Armstrong Aerospace Medical Research Laboratory</i> , AAMRL-TR-80-039, August, 1980.
✓	✓	KONTARINIS et al., "Tactile Display of Vibratory Information in Teleoperation and Virtual Environments," <i>PRESENCE</i> , 4(4):387-402, Harvard Univ., 1995.
✓	✓	AUKSTAKALNS et al., "Silicon Mirage: The Art and Science of Virtual Reality," ISBN 0-938151-82-7, pp. 129-180, 1992.
✓	✓	EBERHARDT et al., "Inducing Dynamic Haptic Perception by The Hand: System Description and Some Results," <i>DSC-Vol. 55-1, Dynamic Systems and Control: Volume 1</i> , ASME 1994.
✓	✓	GOBEL et al., "Tactile Feedback Applied to Computer Mice," <i>International Journal of Human-Computer Interaction</i> , Vol. 7, No. 1, pp. 1-24, 1995.
✓	✓	PIMENTEL et al., "Virtual Reality: through the new looking glass," 2 nd Edition; McGraw-Hill, ISBN 0-07-050167-X, pp. 41-202, 1994.
✓	✓	"Cyberman Technical Specification," <i>Logitech Cyberman SWIFT Supplement to Logitech Mouse Technical Reference and Programming Guide</i> , 4/5/1994.
✓	✓	OHYOUNG et al., "The Development of A Low-Cost Force Feedback Joystick and Its Use in the Virtual Reality Environment," <i>Proceedings of the Third Pacific Conference on Computer Graphics and Applications, Pacific Graphics '95</i> , Seoul, Korea, 21-24 August 1995.
✓	✓	KACZMAREK et al., "Tactile Displays," <i>Virtual Environment Technologies</i> , Chap. 9, pp. 349-414.
✓	✓	LAKE, "Cyberman from Logitech," at http://www.fibitio.org/GameBytes/Issue21/greviews/cyberman.html , 1994.
✓	✓	"Component Maintenance Manual With Illustrated Parts List, Coaxial Control Shaker Part no. C-25502," <i>Safe Flight Instrument Corporation</i> , Revised 28 January 2002 (3 pages).

Examiner Signature	/Seokyun Moon/	Date Considered	07/06/2006
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**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

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Sheet 5 of 6

Complete If Known

Application Number	10/871,485
Filing Date	September 29, 2003
First Named Inventor	Alex S. Goldenberg
Art Unit	2873
Examiner Name	Unassigned
Attorney Docket Number	IMMR-073/02US

OTHER PRIOR ART – NON PATENT LITERATURE DOCUMENTS		
Examiner Initials *	Cite No. †	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
✓	1a	"Technical Manual Overhaul Instructions With Parts Breakdown, Coaxial Control Shaker Part no. C-25502," Safe Flight Instrument Corporation, Revised 15 July 1980 (23 pages).
✓	✓	SCANNELL, "Taking a Joystick Ride," Computer Currents, Boston Edition, Vol. 9, No. 11, November 1984
✓	✓	YAMAKITA et al., "Tele-Virtual Reality of Dynamic Mechanical Model," Proceedings of the 1992 IEEE/RSJ International Conference on Intelligent Robots and Systems, Raleigh, NC, July 7-10, 1992
✓	✓	NOLL, "Man-Machine Tactile," SID Journal, July/August 1972 Issue.
✓	✓	ROSENBERG, "Virtual Features: Perceptual Overlays Enhance Operator Performance in Telepresence Tasks," Ph.D. Dissertation, Stanford University, June 1994.
✓	✓	SCHMILT, Brian et al., "Application Areas for a Force-Feedback Joystick," ASME 1993, DSC-Vol. 49, pp. 47-54.
✓	✓	HASSER, Christopher John, "Tactile Feedback for a Force-Reflecting Haptic Display," The School of Engineering, University of Dayton, December 1995, pp. iii-xii & 1-96.
✓	✓	AKAMATSU, M. et al., "Multimodal Mouse: A Mouse-Type Device with Tactile and Force Display," Presence, Vol. 3, No. 1, 1994, pp. 73-80.
✓	✓	KELLEY, A. J. et al., "MagicMouse: Tactile and Kinesthetic Feedback in the Human-Computer Interface using an Electromagnetically Actuated Input/Output Device," Dept. of Elec. Eng., Univ. of Brit. Columbia, 1993, pp. 1-27.
✓	✓	HASSER, C. et al., "Tactile Feedback with Adaptive Controller for a Force-Reflecting Haptic Display," Parts 1&2, IEEE 0-7803-3131-1, 1996, pp. 526-533.
✓	✓	RAMSTEIN, C., "Combining Haptic and Braille Technologies: Design Issues and Pilot Study," ASSETS '96, 2nd Annual ACM Conf. on Assistive Technologies, 1996, pp. 37-44.
✓	✓	DENNERLEIN, et al., "Vibrotactile Feedback for Industrial Telemanipulators," ASME IMECE, 6th Annual Symp. On Haptic Interfaces for Virtual Environment and Teleoperator Systems, Nov. 1997, pp. 1-7.
✓	✓	MINISKY, Margaret et al., "Feeling and Seeing: Issues in Force Display," ACM 089791-351-5, 1990, pp. 235-242.
✓	✓	OUH-YOUNG, M. et al., "Creating an Illusion of Feel: Control Issues in Force Display," Computer Science Dept., University of North Carolina, 1989, pp. 1-14.
✓	✓	HASSER, C., "Force-Reflecting Anthropomorphic Hand Masters," AUCF-TR-1996-0110, 1995, pp. 5-31.

Examiner Signature	/Seokyun Moon/	Date Considered	07/06/2006
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Sheet 6 of 6

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Application Number	10/671,485
Filing Date	September 29, 2003
First Named Inventor	Alex S. Goldenberg
Art Unit	2673
Examiner Name	Unassigned
Attorney Docket Number	IMMR-073/02US

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✓	2	Kim, Won, "Telemanipulator Technology and Space Telerobotics," SPIE Proceedings, 1993, Vol. 2057, pp. 40-50.

Examiner Signature	/Seokyun Moon/	Date Considered	07/06/2006
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)		Application Number	Unknown
		Filing Date	September 29, 2003
		First Named Inventor	Alex S. GOLDENBERG
		Group Art Unit	2673
		Examiner Name	Unassigned
		Attorney Docket Number	IMMR-073/02US
Sheet 2	of 4		

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No. ¹	Foreign Patent Document			Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY
		Office ¹	Number ²	Kind Code ³ (if known)		
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STATEMENT BY APPLICANT

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Complete if Known

Application Number	Unknown
Filing Date	September 29, 2003
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Attorney Docket Number	IMMR-073/02US

3 of 4

OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
	C1	Balgrie, "Electric Control Loading - A Low Cost, High Performance Alternative," <i>Proceedings of Interservice/Industry Training Systems Conference</i> , pp. 247-254, November 6-8, 1990	
	C2	Iwata, "Pen-based Haptic Virtual Environment," 0-7803-1363-1/93 IEEE, pp. 287-292, 1993	
	C3	Russo, "The Design and Implementation of a Three Degree of Freedom Force Output Joystick," <i>MIT Libraries Archives</i> pp. 1-131, May 1990, archived 8/14/90	
	C4	Brooks et al., "Hand Controllers for Teleoperation - A State-of-the-Art Technology Survey and Evaluation," <i>JPL Publication 85-11</i> , NASA-CR-175890; N85-28559, pp. 1-84, 03/1/1985	
	C5	Jones et al., "A perceptual analysis of stiffness," ISSN 0014-4819 Springer International (Springer-Verlag); <i>Experimental Brain Research</i> , Vol. 79, No. 1, pp. 150-156, 1990	
	C6	Burdea et al., "Distributed Virtual Force Feedback, Lecture Notes for Workshop on Force Display in Virtual Environments and its Application to Robotic Teleoperation," <i>1993 IEEE International Conference on Robotics and Automation</i> , pp. 25-44, 05/02/1993	
	C7	Snow et al., "Model-X Force-Reflecting-Hand-Controller," NT Control No. NPO-17851; JPL Case No. 7348, pp. 1-4 with 45 pages of attachments, 06/15/1989	
	C8	Ouh-Young, "Force Display in Molecular Docking," Doctoral Dissertation, University of North Carolina at Chapel Hill, UMI Order No. 9034744, p. 1-369, 1990	
	C9	Tadros, "Control System Design for a Three Degree of Freedom Virtual Environment Simulator Using Motor/Brake Pair Actuators," <i>MIT Archive</i> , pp. 1-88, February 1990, archived 8/13/90	
	C10	Caldwell et al., "Enhanced Tactile Feedback (Tele-Taction) Using a Multi-Functional Sensory System," 1050-4729/93, pp. 955-960, 1993	
	C11	Adelstein et al., "Design and Implementation of a Force Reflecting Manipulandum for Manual Control research," DSC-Vol. 42, <i>Advances in Robotics</i> , pp. 1-12, 1992	
	C12	Gotow et al., "Controlled Impedance Test Apparatus for Studying Human Interpretation of Kinesthetic Feedback," WAI11-11:00, pp. 332-337	
	C13	Stanley et al., "Computer Simulation of Interacting Dynamic Mechanical Systems Using Distributed Memory Parallel Processors," DSC-Vol. 42, <i>Advances in Robotics</i> , pp. 55-61, ASME 1992	
	C14	Russo, "Controlling Dissipative Magnetic Particle Brakes in Force Reflective Devices," DSC-Vol. 42, <i>Advances in Robotics</i> , pp. 63-70, ASME 1992	
	C15	Kontarinis et al., "Display of High-Frequency Tactile Information to Teleoperators," <i>Telemanipulator Technology and Space Telerobotics</i> , Won S. Kim, Editor, Proc. SPIE Vol. 2057, pp. 40-50, Sep. 7-9, 1993	
	C16	Patrick et al., "Design and Testing of A Non-reactive, Fingertip, Tactile Display for Interaction with Remote Environments," <i>Cooperative Intelligent Robotics in Space</i> , Rui J. deFigueiredo et al, Editor, Proc. SPIE Vol. 1387, pp. 215-222, 1990	
	C17	Adelstein, "A Virtual Environment System For The Study of Human Arm Tremor," <i>Ph.D. Dissertation</i> , Dept. of Mechanical Engineering, MIT, June 1989, archived 3/13/90	
	C18	Bejczy, "Sensors, Controls, and Man-Machine Interface for Advanced Teleoperation," <i>Science</i> , Vol. 208, No. 4450, pp. 1327-1335, 1980	
	C19	Bejczy et al., "Generalization of Bilateral Force-Reflecting Control of Manipulators," <i>Proceedings Of Fourth CISM-IFTOMM</i> , Sep. 8-12, 1981	
	C20	McAfee et al., "Teleoperator Subsystem/Teleoperator Demonstrator. Force Reflecting Hand Controller Equipment Manual," JPL 1988, JPL D-5172	
	C21	Minsky, "Computational Haptics: The Sandpaper System for Synthesizing Texture for a Force-Feedback Display," <i>Ph.D. Dissertation</i> , MIT, June 1995, archived 7/6/95	
	C22	Jacobsen et al., "High Performance, Dexterous Telerobotic Manipulator With Force Reflection," <i>Intervention/ROV '91 Conference & Exposition</i> , Hollywood, Florida, May 21-23, 1991	
	C23	Shimoga, "Finger Force and Touch Feedback Issues in Dexterous Telemanipulation," <i>Proceedings of Fourth Annual Conference on Intelligent Robotic Systems for Space Exploration</i> , Rensselaer Polytechnic Institute, Sep. 30- Oct. 1, 1992	
	C24	IBM Technical Disclosure Bulletin, "Mouse Ball-Actuating Device With Force and Tactile Feedback," Vol. 32, No. 9B, February 1990	
	C25	Terry et al., "Tactile Feedback In A Computer Mouse," <i>Proceedings of Fourteenth Annual Northeast Bioengineering Conference</i> , University of New Hampshire, March 10-11, 1988	
	C26	Howe, "A Force-Reflecting Teleoperated Hand System for the Study of Tactile Sensing in Precision Manipulation," <i>Proceedings of the 1992 IEEE International Conference on Robotics and Automation</i> , Nice, France, May 1992	
	C27	Eberhardt et al., "OMAR - A Haptic display for speech perception by deaf and deaf-blind individuals," <i>IEEE Virtual Reality Annual International Symposium</i> , Seattle, WA, Sep. 18-22, 1993	

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		Application Number	Unknown
		Filing Date	September 29, 2003
		First Named Inventor	Alex S. GOLDENBERG
		Group Art Unit	2673
		Examiner Name	Unassigned
		Attorney Docket Number	IMMR-073/02US

—	C28	Rabinowitz et al., "Multidimensional tactile displays: Identification of vibratory intensity, frequency, and contractor area," <i>Journal of The Acoustical Society of America</i> , Vol. 82, No. 4, October 1987	
↓	C29	Bejezy et al., "Kinesthetic Coupling Between Operator and Remote Manipulator," <i>International Computer Technology Conference. The American Society of Mechanical Engineers</i> , San Francisco, CA, August 12-15, 1980	
↓	C30	Bejezy et al., "A Laboratory Breadboard System For Dual-Arm Teleoperation," <i>SOAR '89 Workshop</i> , JSC, Houston, TX, July 25-27, 1989	
↓	C31	Ouhyoung et al., "A Low-Cost Force Feedback Joystick and Its Use in PC Video Games," <i>IEEE Transactions on Consumer Electronics</i> , Vol. 41, No. 3, August 1995	
↓	C32	Marcus, "Touch Feedback in Surgery," <i>Proceedings of Virtual Reality and Medicine The Cutting Edge</i> , Sep. 8-11, 1994	
↓	C33	Bejezy, et al., "Universal Computer Control System (UCCS) For Space Telerobots," CH2413-3/87/0000/0318501.00 1987 IEEE, 1987	

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Sheet **3** of **6****Complete If Known**

Application Number	10/671,465
Filing Date	September 29, 2003
First Named Inventor	Alex S. Goldenberg
Art Unit	2673
Examiner Name	Unassigned
Attorney Docket Number	IMMR-073/02US

U.S. PATENT DOCUMENTS

Examiner	Cite No. ¹	Document Number Number Kind Code ² (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
S.M.		4,795,296	1/3/88	Jau	
		4,731,603	3/15/88	McRae et al.	
		4,706,294	11/10/87	Ouchida	
		4,484,191	11/20/1984	Vavra	
		4,464,117	8/7/1984	Foerst	
		4,414,984	11/15/83	Zarudiansky	
		4,333,070	6/1/1982	Barnes	
		4,262,549	4/21/1981	Schweilenbach	
		4,127,752	11/28/1978	Lowthorp	
		3,919,691	11/11/75	Noll	
		2,972,140	2/14/1961	Hirsch	
		RE37,374	9/18/01	Roston et al.	

Examiner Initials ¹	Cite No. ¹	Foreign Patent Document			Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Country Code ³	Number ⁴	Kind Code ⁵ (if known)			
		JP	H2-185278		7/19/1990	Taito Corporation	
		JP	H4-8381		1/13/1992	Epoch Co. and Key- Planning Co.	
		JP	H7-24147		1/27/1995	Sega Corporation	
		JP	H5-192449		8/3/1993	Taito Corporation	
		WO	92/00559		1/8/1992		
		EP	0607580	A1	7/27/1994		
		EP	0265011		4/27/1988		
		EP	0626834	A2	5/11/1994		
		WO	01/03105		1/11/2001		
		WO	01/24158		4/5/2001		
		WO	97/31333		8/28/1997		
		WO	01/13354		2/22/2001		
		WO	98/32112		7/23/1998		
		WO	99/40504		12/8/1999		
		WO	02/27705		4/4/2002		

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Sheet **4** of **6**

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Application Number	10/871,485
Filing Date	September 29, 2003
First Named Inventor	Alex S. Goldenberg
Art Unit	2673
Examiner Name	Unassigned
Attorney Docket Number	IMMR-073/02US

OTHER PRIOR ART – NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
—		PATRICK, "Design, Construction, and Testing of a Fingertp Tactile Display for Interaction with Virtual and Remote Environments," <i>Master of Science Thesis</i> , MIT, Aug. 1990, archived Nov. 8, 1990.
		CALDER, "Design of A Force-Feedback Touch-Introducing Actuator For Teleoperator Robot Control," <i>Bachelor of Science Thesis</i> , MIT, May 1983, archived June 23, 1983.
		WIKER, "Teletouch Display Development: Phase 1 Report," <i>Technical Report 1230</i> , Naval Ocean Systems Center, San Diego, July 1988.
		BLISS, "Optical-to-Tactile Image Conversion for the Blind," <i>IEEE Transactions on Man-Machine Systems</i> , Vol. MMS-11, No. 1, March 1970.
		JOHNSON, "Shape-Memory Alloy Tactile Feedback Actuator," <i>Armstrong Aerospace Medical Research Laboratory</i> , AAMRL-TR-90-039, August, 1990.
		KONTARINIS et al., "Tactile Display of Vibratory Information in Teleoperation and Virtual Environments," <i>PRESENCE</i> , 4(4):387-402, Harvard Univ., 1995.
		AUKSTAKALNIS et al., "Silicon Mirage: The Art and Science of Virtual Reality," ISBN 0-938151-82-7, pp. 129-180, 1992.
		EBERHARDT et al., "Inducing Dynamic Haptic Perception by The Hand: System Description and Some Results," <i>DSC-Vol. 55-1, Dynamic Systems and Control: Volume 1</i> , ASME 1994.
		GOBEL et al., "Tactile Feedback Applied to Computer Mice," <i>International Journal of Human-Computer Interaction</i> , Vol. 7, No. 1, pp. 1-24, 1995.
		PIMENTEL et al., "Virtual Reality: through the new looking glass," 2 nd Edition; McGraw-Hill, ISBN 0-07-050167-X, pp. 41-202, 1994.
		"Cyberman Technical Specification," <i>Logitech Cyberman SWIFT Supplement to Logitech Mouse Technical Reference and Programming Guide</i> , 4/5/1994.
		OUHYOUNG et al., "The Development of A Low-Cost Force Feedback Joystick and Its Use in the Virtual Reality Environment," <i>Proceedings of the Third Pacific Conference on Computer Graphics and Applications, Pacific Graphics '95</i> , Seoul, Korea, 21-24 August 1995.
		KACZMAREK et al., "Tactile Displays," <i>Virtual Environment Technologies</i> , Chap. 9, pp. 349-414.
		LAKE, "Cyberman from Logitech," at http://www.lbiblio.org/GameBytes/Issue21/greviews/cyberman.html , 1994.
V		"Component Maintenance Manual With Illustrated Parts List, Coaxial Control Shaker Part no. C-25502," Safe Flight Instrument Corporation, Revised 28 January 2002 (3 pages).

Examiner Signature	/Seokyun Moon/	Date Considered	07/06/2006
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